

A Roadside Guide to the Volcanic Beginnings of Ancient Lake Florissant

This guide directs visitors to locations outside of the Monument to see the Guffey volcanic center and the products of its eruption. The Guffey volcano strongly influenced the geologic history at Florissant and facilitated the preservation of fossils. This excursion will provide the visitor with a better understanding about how the volcano affected the development of ancient Lake Florissant.

Geologic History of the Florissant Formation

The Florissant Formation was formed in association with a series of volcanic eruptions from the Guffey volcanic center, which is part of the Thirtynine Mile volcanic field and is located approximately 18 miles southwest of the Monument. Volcanic eruptions from the Guffey volcanic center were similar to those produced by modern Mt. St. Helens and included mudflows, ashfalls, lava flows, and domes. The sequence of events that influenced the Florissant area is as follows:

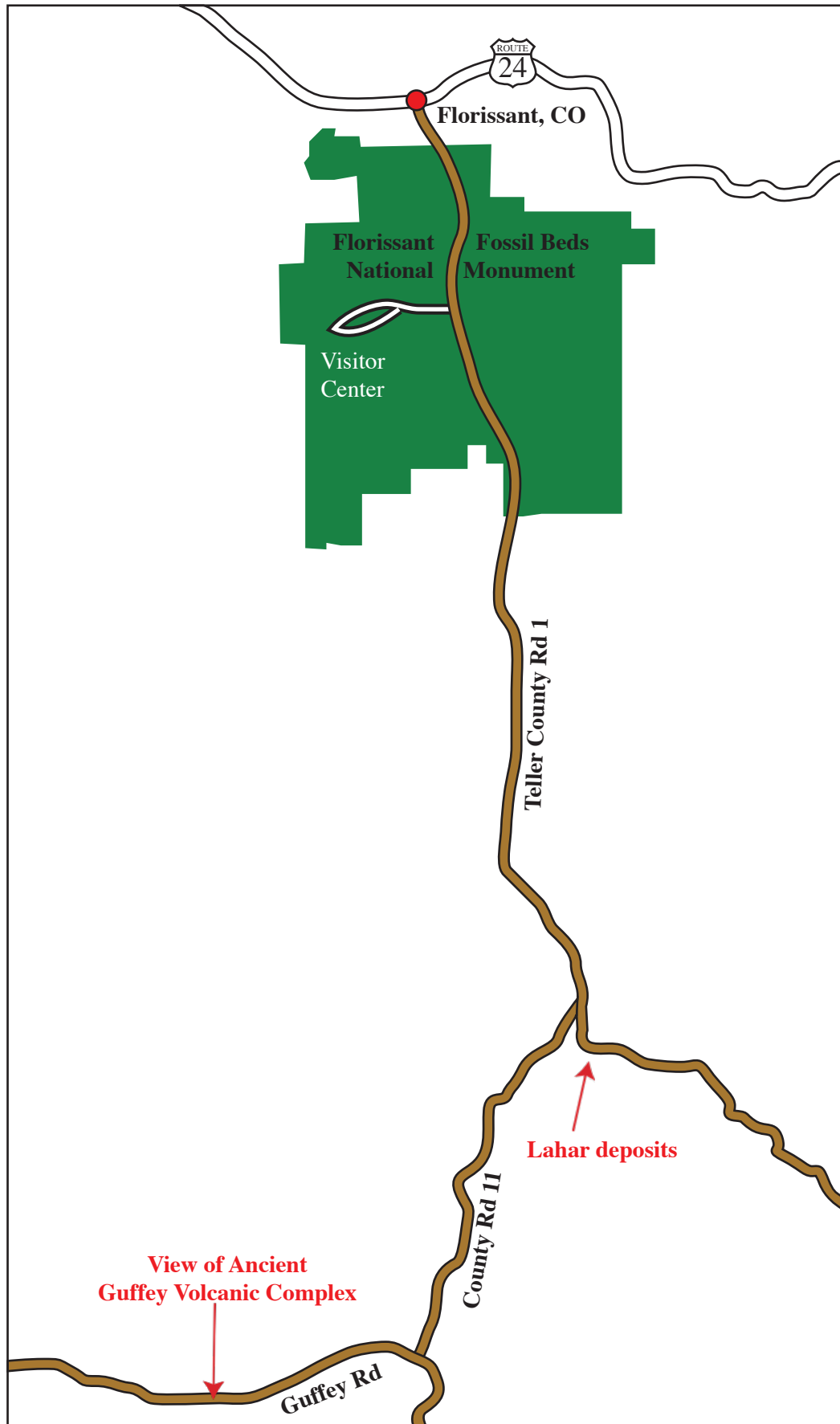
- 1) A series of large volcanic mudflows (also called lahars) originated from the slopes of the Guffey volcanic center and flowed into the ancient valleys. One of these lahars buried the large redwoods and other trees in the ancient Florissant valley. Another flowed down the paleodrainage of Four Mile Creek to the confluence with the Florissant paleovalley, where it formed a natural dam. This dam impounded the Florissant paleovalley and created ancient Lake Florissant.
- 2) Explosive, gaseous eruptions from the Guffey volcanic center deposited layers of ash and pumice in and around the lake basin. Some of the ash partially weathered to clay and was slowly deposited along with diatoms (microscopic algae with hard silica "shells") to form thin layers of shale on the lake bottom. These lake shales contain the extraordinarily well-preserved plant and insect fossils. Occasionally, more violent eruptions from the Guffey volcanic center produced thicker layers of ash and pumice that were deposited rapidly between the shale layers.
- 3) A later lahar from the Guffey volcanic center produced a 'caprock', which separates the two layers of lake shales in the Florissant Formation. This lahar was deposited under water in ancient Lake Florissant. On top of this 'caprock', another layer of lake shales was slowly deposited in the same process described in step 2.
- 4) The final 'filling in' of the ancient lake also originated from the Guffey volcanic center and makes up the uppermost layer of the Florissant Formation. This layer is composed mostly of pumice and ash.

Directions (see map Page 2)

Turn right on Teller County Rd. 1 out of the Florissant Fossil Beds Visitor Center parking lot (going south).

View of Ancient Guffey Volcanic Complex: After 6.7 miles, turn right on County Rd. 11 just before Evergreen Station. Follow that road approximately 4 miles until you reach a 'Y' in the road. Turn right onto Guffey Rd. and follow it for 2.7 miles until you see a large turn off on the left side of the road (just past mile marker 14) at the crest of a hill. Park here, and cross the road. Walk out about 150 yards perpendicular to the road (heading north) to the overlook of Thirtynine Mile volcanic field. (Description of Overlook)

Lahar deposits: Return to your vehicle and re-trace the route you took until you reach the intersection of Teller County Rd. 1 and 11. Turn right on Teller County Rd. 1 and park at the Evergreen Station General Store (0.1 miles on the left). Walk about 100 yards south to the road cut. This is a dangerous area for pedestrians, so use extreme caution! (Description of road cut)



Map to the Florissant area and nearby geologic interests.

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View of Ancient Guffey Volcanic Complex

Note: The panorama to the left was taken from the top of a high rocky ridge, which you can climb if you are very careful. From the lower viewpoint, Witcher Mountain and the southernmost part of the Guffey volcanic center are not visible.

You are standing on the Cripple Creek Granite, dated between 1.40 and 1.43 billion

years old. From here you can see the deeply eroded remains of the domes and lava flows of the Guffey Volcanic Center, today just remnants of the once large stratovolcanoes (similar to Mt. St. Helens and Mt. Rainier) that existed here 34 million years ago. Other mountains of the Thirtynine Mile volcanic field (including Witcher, McIntyre, Castle, and Thirtynine Mile) are comprised of the stratified lava flows (formed from molten lava) and lahars (formed from a cooler flow of mixed debris) that formed on the flanks of the Guffey Volcanic Center. The lahars filled in an ancient valley that was to the left of the modern Four Mile Creek that you see below. These lahars filled the valley before you to a level that would have extended far above your head! Most of these lahars were later eroded away, although remnants can be seen as outcrops (the low hills) south of the Four Mile Creek drainage, and also in the road cut at the other stop on this trip. When the new drainage was reestablished and eroded through these lahars, it encountered this section of the underlying, harder Cripple Creek granite, formerly a ridge that was later covered by lahars. "Trapped" in the valley that it had already begun carving through the lahars, the stream was forced to continue eroding its channel through this mile-long section of the granite. This process resulted in the formation of the canyon that you see to the right of this viewpoint.

Lahar Dam

At this roadcut we can see the lahar from the Guffey Volcanic Center that dammed the Florissant paleovalley, forming ancient Lake Florissant. This lake was about a mile wide and extended 12 miles to the north. Which direction did the Florissant paleodrainage flow 34 million years ago?

Notice the poorly sorted material (sediments of all different sizes) and the various rock types? Most of the rock fragments

we see in the lahar are andesite (a dark, fine-grained volcanic rock) with some Cripple Creek Granite (course-crystalline with reddish-orange feldspar). Some of the more rounded cobbles may have been picked up along the stream channel in the paleovalley that the lahar followed. This location is near the contact between the Pikes Peak Granite (1.08 billion years old), which lies to the east of this site, and the much older Cripple Creek Granite (1.40-1.43 billion years old) which lies to the west. These two granitic rocks both formed in a batholith (a magma chamber that cooled underground), but came from different sources.

